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PATENT SPECIFICATION

(11)

1 426 035

1 426 035

- (21) Application No. 1759/74 (22) Filed 14 Jan. 1974
(31) Convention Application No. 325 519 (32) Filed 22 Jan. 1973 in
(33) United States of America (US)
(44) Complete Specification published 25 Feb. 1976
(51) INT. CL.³ B65G 65/72
(52) Index at acceptance
B8A 3E 3K



(54) QUICK RELEASE AERATOR DEVICE

(71) We, MARTIN ENGINEERING COMPANY, a Corporation organised under the laws of the State of Illinois, United States of America, of Neponset, Illinois 5 61345, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and 10 by the following statement:—

The present invention relates to a quick-release aerator device that stores a large volume of air under significant pressure and then releases the air instantaneously 15 into a storage receptacle. The storage of granular and like materials in bins, silos, etc. creates many problems, particularly in the discharge of such materials after prolonged storage, because the material has 20 a tendency to "bung up" and refuse to flow. These problems can be solved to some extent by the use of vibrators and other mechanical means but these have been found to be costly and apt to cause 25 structural damage to the bin, silo, etc. The use of a quick-release aerator, in accordance with the present invention, to release a volume of air under pressure into a

of the tube and arranged co-axially with the tube to extend between the second end wall and a position where it is in overlapping relationship with the terminal end of the tube to provide with the tube an 50 annular air passage, closure means having an air inlet opening and positioned in the end of the cylinder adjacent the second end wall, and a piston element slidably mounted within the cylinder to control air 55 flow through the tube and through a plurality of radial air ports formed in the wall of the cylinder.

It is a feature of the invention that the aerator can be constructed simply and in- 60 expensively. It has only one moving part; e.g. a simple valve. It uses compressed air and is easily controlled and it lends itself well to multiple installations, having regard especially to the fact that the aerator can 65 be charged by a relatively small compressor. Installation is simple, requiring only that the silo, bin etc. be provided with one opening per aerator, and a flange on the aerator tube can be easily field-wel- 70 ded to the silo etc., with the tube entering the opening to conduct the sudden release of energy directly into the grain or other

PATENTS ACT 1949

SPECIFICATION NO 1426035

Amendment is made in accordance with the Decision of the Principal Examiner acting for the Comptroller-General, dated the 4th day of August 1977 under Section 9 in the following manner:-

Reference has been directed in pursuance of Section 9 subsection (1) of the Patents Act 1949 to Patent No. 1454261.

THE PATENT OFFICE
16 September 1977

Bas 41476/1

PATENT SPECIFICATION

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The present invention relates to a quick-release aerator device that stores a large volume of air under significant pressure and then releases the air instantaneously into a storage receptacle. The storage of granular and like materials in bins, silos, etc. creates many problems, particularly in the discharge of such materials after prolonged storage, because the material has a tendency to "bung up" and refuse to flow. These problems can be solved to some extent by the use of vibrators and other mechanical means but these have been found to be costly and apt to cause structural damage to the bin, silo, etc. The use of a quick-release aerator, in accordance with the present invention, to release a volume of air under pressure into a storage receptacle, produces substantially the equivalent of a "dull explosion" that causes even the most stubborn material to flow freely.

According to the present invention, there is provided a quick-release aerator device provided to be attached to a receptacle for granular and like material to facilitate the flow of said material, the device comprising a container having first and second end walls, a tube of smaller cross-sectional area than that of the container and having a discharge end and a terminal end, the tube extending through the first end wall so that its terminal end is spaced axially from the second end wall, a cylinder of slightly larger cross-sectional area than that

of the tube and arranged co-axially with the tube to extend between the second end wall and a position where it is in overlapping relationship with the terminal end of the tube to provide with the tube an annular air passage, closure means having an air inlet opening and positioned in the end of the cylinder adjacent the second end wall, and a piston element slidably mounted within the cylinder to control air flow through the tube and through a plurality of radial air ports formed in the wall of the cylinder.

It is a feature of the invention that the aerator can be constructed simply and inexpensively. It has only one moving part; e.g. a simple valve. It uses compressed air and is easily controlled and it lends itself well to multiple installations, having regard especially to the fact that the aerator can be charged by a relatively small compressor. Installation is simple, requiring only that the silo, bin etc. be provided with one opening per aerator, and a flange on the aerator tube can be easily field-welded to the silo etc., with the tube entering the opening to conduct the sudden release of energy directly into the grain or other material. Standard size tubing may be used to construct the aerator.

The invention is now described by way of example with reference to the accompanying drawings, in which:—

Figure 1 is a cross-sectional view of the aerator.

Figure 2 is a section on the line 2-2 of Figure 1.

Figure 3 is a schematic view illustrating the use of the aerator.

Referring to the drawings, the aerator has a shell-like container 10 including a peripheral wall 12 and first and second opposite end walls 14 and 16. Preferably the container is circular in cross-section; in the present example, it has a length of twenty-

tw inches and a diameter of twelve inches. Th first end wall 14 has an air inlet opening which receives a tube 18 (to be described in greater detail later) and the second end wall has a central circular aperture 20.

An elongated tube 22, preferably circular in cross-section, extends through the aperture 20 and is welded in place in keeping with the air-tight nature of the structure. This tube has an outer discharge end 24 and an inner end 26 spaced axially from the end wall 14 by a cylinder 28. The tube 22 is of substantially smaller diameter than that of the container 10. In the present example, the diameter of the tube is about one-third that of the container. The cylinder 28 has a slightly larger diameter than the tube and its end proximate to the inner end of the tube is in overlapping relationship with the tube to provide an annular space, which space provides air passage means 30. For structural rigidity, the two end portions of the tube and cylinder are secured together, as by welding, by means of a plurality of spacer means 32 (Figure 2).

The end of the cylinder 28 that lies proximate to the first end wall 14 of the container is welded concentrically to that end wall and is itself closed by a cap 34 sealed to the interior of the cylinder 28 by annular seal means 36. A snap ring 38 and a pair of cap screws 40 completes this end of the assembly. The cap is centrally tapped to receive the air inlet tube 18.

The outer end of the tube 22 has means for mounting the aerator to a receptacle, such as a silo 42 (Figure 3). This means here takes the form of a steel flange 44 welded to the tube 22. In practice, an opening is cut in the silo wall, the tube 22 inserted and the flange 44 welded to the silo wall. A quick-release three-way valve of conventional design is provided at 46 to connect the air inlet opening 18 to a supply line 48 of an air compressor 50. The valve 46 may be solenoid-operated for remote control and is here shown as equipped with a conventional muffler 52.

A simple piston 54 of cup-shaped formation having a radial face and a cylindrical body portion controls the communication of air among the cylinder, container and tube 22. This piston preferably fits loosely within the cylinder and has an annular seal means, such as an "O" ring 56 for controlling air port means 58 in the cylinder wall. The radial face of the piston that is disposed toward the inner end 26 of the tube 22 has elastomer seat means in the form of a seating ring 60 adapted to seat on the tube end 26. An elastomer bumper 62 is provided on the inside face of the cap 34 to be engaged by the end of the

body portion of the piston 54 to absorb rebound shocks of the piston 54 as container air is discharged through the tube 22.

In the position of the piston as shown, the air port means 58 are closed by the "O" ring 56 and the seating ring 60 is spaced away from the tube end 26. When the cylinder is charged via the air inlet tube 18 and valve 46, the piston moves to the right, causing the seating ring 60 to seat on the tube end 26 and thus to close the tube against communication of air from the container. At the same time, the "O" ring 58 moves past the air port means, allowing cylinder air to flow into the container 28, where approximately nine cubic feet of air are accumulated at about ninety pounds per square inch. So long as the piston remains to the right under compressor pressure, no air can escape from the container to the tube 22.

When however, the valve 46 is opened, the piston moves quickly to the left under pressure from the container flowing through the air passage means 30, because there is no longer any pressure holding the piston to the right. This sudden release of air from the container is exhausted rapidly through the tube 22 and into the silo, etc.

This process is repeated as often as is necessary. Where several aerators are installed on a single receptacle, silo, bin, etc., many types of controls are available; e.g., timers, sequence switches, etc. Several aerators may be connected to discharge at once.

Because the device has only one moving part, maintenance is simple. The cap 34 may be easily removed for access to the piston.

WHAT WE CLAIM IS:—

1. A quick-release aerator device provided to be attached to a receptacle for granular and like material to facilitate the flow of said material, the device comprising a container having first and second end walls, a tube of smaller cross-sectional area than that of the containers and having a discharge end and a terminal end, the tube extending through the first end wall so that its terminal end is spaced axially from the second end wall, a cylinder of slightly larger cross-sectional area than that of the tube and arranged co-axially with the tube to extend between the second end wall and a position where it is in overlapping relationship with the terminal end of the tube to provide with the tube an annular air passage, closure means having an air inlet opening and positioned in the end of the cylinder adjacent the second end wall, and a piston element slidably mounted within the cylinder to control air flow through the tube and through a

plurality of radial air ports formed in the wall of the cylinder.

2. A device as claimed in claim 1, in which the piston element is of cup-shaped formation having a radial face engageable with the terminal end of the tube and a cylindrical body portion.

3. A device as claimed in claim 2, in which the radial face of the piston element is provided with an elastomer seating ring positioned to engage the terminal end of the tube.

4. A device as claimed in claim 2 or claim 3, in which the closure means is provided with an elastomer bumper element for engagement by the end of the body portion of the piston element.

5. A device as claimed in any one of claims 1 to 4, in which annular sealing means is provided in the outer peripheral surface of the piston element to co-act with the radial air ports.

6. A device as claimed in any one of claims 1 to 5, in which the cylinder end closure means comprise an end cap in sealed engagement with the inner periphery

of the cylinder, and retainer means for detachably holding the end cap in position.

7. A device as claimed in any one of claims 1 to 6, in which the discharge end of the tube is provided with an annular flange by which, in the position of use, the device is secured to a receptacle with the discharge end of the tube in communication with the interior of the receptacle.

8. A quick-release aerator device, substantially as hereinbefore described with reference to, and as shown in, the accompanying drawing.

9. A receptacle for granular and like materials having a quick-release aerator device as claimed in any one of claims 1 to 7.

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FIG. 1

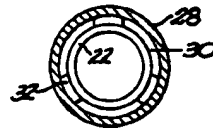
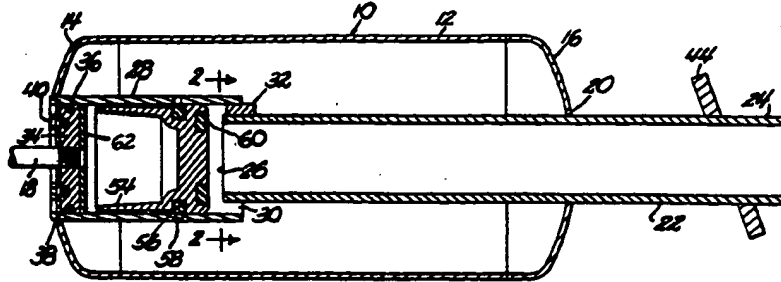


FIG. 2

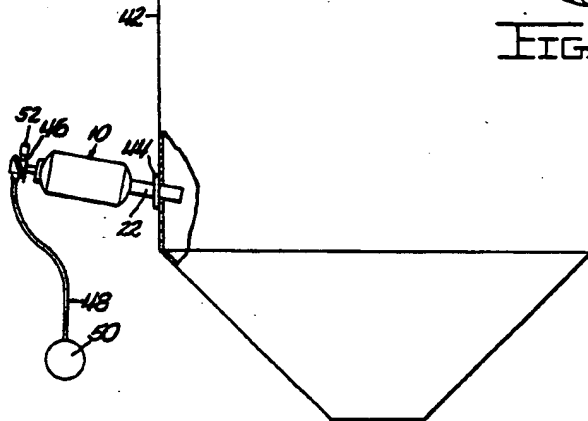


FIG. 3